

THE PRESENT STATE OF KNOWLEDGE OF THE CENOZOIC BIRDS OF ARGENTINA¹

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ABSTRACT: An annotated list by age and a summary by order of the Cenozoic birds of Argentina is presented. A re-evaluation of fossil taxa over which there has not been general agreement as to systematic position allows the following conclusions: (1) *Neculus rothi* Ameghino 1905 is a synonym of *Palaeosphe-niscus gracilis* Ameghino 1899; (2) *Palaeoapterodytes ictus* Ameghino 1905 is a synonym of *Palaeosphe-niscus bergi* Moreno and Mercerat 1891; (3) *Eudromia* and perhaps *Nothura* are present in Monteher-mosan sediments of Buenos Aires Province; (4) *Phalacrocorax pampeanus* Moreno and Mercerat 1891, from late Pleistocene deposits of Buenos Aires Province, is assignable to the living species *P. brasili-anus*; (5) *Dryornis pampeanus* Moreno and Mercerat 1891 is a vulturid closely related to *Vultur*.

Preliminary analysis of new material currently under study reveals (1) an anseriform that shows affinities with the Tachyerini from late Oligocene–early Miocene marine deposits of Patagonia; (2) that the earliest known specimens of phorusrhacoids appear in Casamayoran (early Eocene) deposits of Patagonia.

RESUMEN: Se presenta una lista anotada por edad y un resumen por orden de las aves cenozoicas de Argentina. La reevaluación de los taxa fósiles sobre los cuales no hay un consenso respecto a su posición taxonomica permite llegar a las siguientes conclusiones: (1) *Neculus rothi* Ameghino 1905 es sinónimo de *Palaeosphe-niscus gracilis* Ameghino 1899; (2) *Palaeoapterodytes ictus* Ameghino 1905 es sinónimo de *Palaeosphe-niscus bergi* Moreno and Mercerat 1891; (3) *Eudromia* y quizás *Nothura* están presentes en sedimentos Montehermosenses de la Provincia de Buenos Aires; (4) *Phalacrocorax pampeanus* Moreno and Mercerat 1891, de depósitos del Pleistoceno tardío de la Provincia de Buenos Aires es asignado a la especie viviente *P. brasili-anus*; (5) *Dryornis pampeanus* Moreno and Mercerat 1891 es un vultúrido de cercana relación a *Vultur*.

Un análisis preliminar de material nuevo actualmente en estudio revela (1) un anseriforme con afinidad a los Tachyerini de depósitos marinos de Oligoceno superior–Mioceno inferior de Patagonia; y (2) que los primeros especímenes conocidos de phorusrhacoides aparecen en los depósitos casamayorenses (Eoceno tardío) de Patagonia.

The record of Cenozoic birds of Argentina is the most complete for any region of South America. Most of the described forms come from Patagonia, in southern Argentina, thus limiting the record geographically. This has resulted in a restricted knowledge of the origin and evolution of certain groups, especially those presently endemic to the Neotropical Region. In addition, the record for the rest of South America is limited primarily to the Pleistocene (for a brief review of fossil birds of South America see Campbell 1979).

At the end of the 1800's and the beginning of the 1900's Florentino Ameghino described most of the known taxa of Cenozoic Argentinian birds, but his work requires revision as a result of new contributions. A partial revision has been accomplished for his extensive work on the fossil mammals of Argentina, but this is not the case with the birds. Only two avian groups, the phorusrhacoids and penguins, have been

extensively revised. Any revisions have been hindered in part by the scattering of the original materials in different Argentinian and foreign institutions, a fact that has brought about great confusion.

It must be re-emphasized here, as I have before (Tonni 1973), that there are no uniform taxonomic criteria to be used with both fossil and Recent birds. In general, the criteria of paleontologists differ from those of neontologists. When one considers some of the taxonomic problems regarding Recent birds, e.g., polytypic species, sibling species, sexual dimorphism, etc., it is evident that the study of fossil birds, the remains of which are generally very fragmentary, can be difficult and complicated. This points again to the need to revise the works of the pioneer authors using the more rigorous taxonomic standards of today.

In spite of these difficulties, and others common to the study of all fossil vertebrates, the paleontological record of Argentinian birds contributes valuable data on some groups, especially if the information is taken as a whole and not partially.

A list of Cenozoic Argentinian birds, with their geographic

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(1) Epoch Series	(2) Epoch Series	SOUTH AMERICAN LAND MAMMAL AGES
PLEIS- TOCENE	PLEIS- TOCENE	Lujanian
		Ensenadan
PLIO- CENE	PLIO- CENE	Uquian
		Montehermosan
		Huayquerian
		Chasicuan
		Hiatus
MIOCENE	MIOCENE	Friasian
		Santacrucian
		Monte Leon Fm. ("Patagoniano") Marine
		Colhuehuapian
OLIGOCENE	OLIGOCENE	Hiatus
		Deseadan
		Hiatus
EOCENE	EOCENE	Divisaderan
		Hiatus
		Mustersan
		Hiatus
		Casamayoran
PALEOCENE	PALEOCENE	Riochican
		Hiatus
		Salamancan (MARINE)

Figure 1. Cenozoic epochs and the corresponding South American Land Mammal Ages. Modified from Marshall et al. 1977. (1) After Berggren and van Couvering (1974). (2) After Savage (1975).

and stratigraphic data, follows. The scheme of Land Mammal Ages follows that of Pascual et al. (1965) and Pascual and Odreman Rivas (1973); see Figure 1. The Tertiary stratigraphic chart has recently changed significantly, but it is not the purpose of the present study to discuss these changes and the reader is referred to the pertinent literature (Berggren and Van Couvering 1974; Marshall et al. 1977; Marshall et al. 1979). I have re-studied most of the material of doubtful taxonomic position. Preliminary data on material under study are included.

Those orders with a fossil record sufficient to warrant additional comments are discussed at the end of this paper. Such a discussion based on the data presently available is quite limited, and will remain so until the study of fossil birds from the Neotropical Region becomes the focus of attention of a greater number of investigators.

SYSTEMATIC LIST OF CENOZOIC BIRDS FROM ARGENTINA

CASAMAYORAN

Order Phoenicopteriformes,

Family Presbyornithidae:

Presbyornis antiquus (Howard 1955)

LOCALITY AND HORIZON: Cañadón Hondo, near Paso Niemann, Chubut Province. Casamayor Fm.

Presbyornis pervetus Wetmore 1926

LOCALITY AND HORIZON: Cañadón Hondo, near Paso Niemann, Chubut Province. Casamayor Fm.

REMARKS: This specimen was described as *Telmabates howardae* by Cracraft (1970). See Feduccia (1976) for further information.

Order Opisthocomiformes,

Family Onychopterygidae:

Onychopteryx simpsoni Cracraft 1971

LOCALITY AND HORIZON: Cañadón Hondo, near Paso Niemann, Chubut Province. Casamayor Fm.

REMARKS: Brodkorb (1978:215) places this species in Aves Incertae Sedis.

DIVISADERAN

Order Ralliformes, Family Cunampaiidae:

Cunampaia simplex Rusconi 1946

LOCALITY AND HORIZON: 500 m west of Mina Atala, Departamento de Las Heras, Mendoza Province. Divisadero Largo Fm.

REMARKS: The systematic position of *Cunampaia simplex* is uncertain. The general consensus is to place it in its own family within the Ralliformes, but its placement within the order varies according to the author. Patterson and Kraglievich (1960:12) state that "su posición dentro de la Clase es por ahora incierta"—"its position within the Class is for now uncertain." Wetmore (1960) considered the position of the family within the Ralliformes to be uncertain, a treatment followed by Cracraft (1968). Brodkorb (1967) includes the family Cunampaiidae in the suborder Cariamae.

DESEADAN

Order Ardeiformes, Family Ciconiidae:

Ciconiopsis antarctica Ameghino 1899

LOCALITY AND HORIZON: Santa Cruz Province. Deseado Fm. ("Guaranitic Fm." of Ameghino).

Order Pelecaniformes,

Family Cladornithidae:

Cladornis pachypus Ameghino 1895

LOCALITY AND HORIZON: Río Deseado, Santa Cruz Province. Deseado Fm.

Order Anseriformes,

Family *incertae sedis*:*Teleornis impressus* Ameghino 1899

LOCALITY AND HORIZON: Santa Cruz Province. Deseado Fm.

Loxornis clivus Ameghino 1895

LOCALITY AND HORIZON: Río Deseado, Santa Cruz Province; Río Chico, west of Puerto Visser, Chubut Province. Deseado Fm.

Order Accipitriformes,

Family Accipitridae?:

Cruschedula revola Ameghino 1899

LOCALITY AND HORIZON: Golfo de San Jorge, Santa Cruz Province. Deseado Fm.

REMARKS: This species is based on the proximal end of a right scapula, as noted by Brodkorb (1964), and not on a tarsometatarsus as stated by Ameghino. The material is not very diagnostic, but its placement in the Accipitridae is probable.

Climacarthrus incompletus Ameghino 1899

LOCALITY AND HORIZON: Santa Cruz Province. Deseado Fm.

REMARKS. This species is based on the distal end of a right tarsometatarsus that lacks the external trochlea, most of the middle trochlea, and the posterior portion of the internal trochlea. This species can be tentatively assigned to the Accipitridae on the basis of characters of the internal trochlea; i.e., it extends distad more than the middle trochlea and has a marked concavity in the proximal part of the internal margin.

Order Ralliformes

The family sequence followed here corresponds to that of Cracraft (1968, 1969).

Family Aramidae:

Aminornis excavatus Ameghino 1899

LOCALITY AND HORIZON: Río Deseado, Santa Cruz Province. Deseado Fm.

Loncornis erectus Ameghino 1899

LOCALITY AND HORIZON: Río Deseado, Santa Cruz Province. Deseado Fm.

Family Phorusrhacidae:

Andrewsornis abbotti Patterson 1941

LOCALITY AND HORIZON: Cabeza Blanca, Chubut Province. Deseado Fm.

Family Brontornithidae:

Physornis fortis Ameghino 1895

LOCALITY AND HORIZON: Río Deseado, Santa Cruz Province. Deseado Fm.

Family Psilopteridae:

Smiliornis penetrans Ameghino 1899

LOCALITY AND HORIZON: Santa Cruz Province. Deseado Fm.

Pseudolarus guaraniticus Ameghino 1899

LOCALITY AND HORIZON: Santa Cruz Province. Deseado Fm.

Family Cariamidae:

Riacama caliginea Ameghino 1899

LOCALITY AND HORIZON: Santa Cruz Province. Deseado Fm.

"PATAGONIANO"

The age of the marine sediments generally referred to as "Patagoniano" has been a matter of great controversy. According to Camacho (1974), the "Patagoniano" is divisible into the following units: the San Julián Formation, strata with *Monophoraster* and *Venericor*, and the Monte León Formation. The type locality of the San Julián Fm. is in the Gran Bajo of San Julián, Santa Cruz Province. The latter two units outcrop from the Golfo de San Jorge and Santa Cruz and Chubut Provinces, northwards to the proximity of Trelew and the lower course of the Río Chubut. These three units were referred by Camacho to the early Eocene, late middle Eocene, and late Oligocene, respectively.

Bertels (in press) considers the San Julián Formation to be late Eocene to early Oligocene in age. Cione and Exposito (in press), on the basis of their study of an ichthyofauna from a unit referred to the *Monophoraster* and *Venericor* strata of the Golfo de San Jorge, state that that unit is at least late Oligocene in age.

Marshall et al. (1977), on the basis of isotopic dating of the sediments of the Santa Cruz and Colhuehuapi Formations that respectively overlie and underlie the Monte León Fm., assigns the Monte León Fm. to the late Oligocene.

Recently, Riggi (1979) recognized a single formational unit (Patagonia Fm.) in the "Patagoniano" sediments. He divides the Patagonia Fm. into two members, the San Julián and the Monte León, both of Oligocene age.

Unfortunately, the penguin remains described by Ameghino and Moreno and Mercerat lack precise geographic and stratigraphic data. There are precise data on only the material studied by Simpson (1946, 1972) from the lower course of the Río Chubut, between Gaiman and Trelew. Field work carried out by the author in this area (Tonni in press) has verified that the associated ichthyofauna indicates the deposits are at least late Oligocene to early Miocene in age.

There is no conclusive evidence demonstrating that the pen-

guins from the more southerly outcrops (Golfo de San Jorge, San Julián) are of a different age. The following nine species are all from the "Patagoniano."

Order Sphenisciformes,
Family Spheniscidae:

Palaeospheniscus gracilis Ameghino 1899

LOCALITY: Golfo de San Jorge, Trelew, Gaiman; Chubut Province.

REMARKS: *Neculus rothi* Ameghino 1905 is included in this species. The holotype is strongly weathered and thus the trochleae appear to be disproportionately small. Other supposedly diagnostic characters, e.g., tarsometatarsus very flattened anteroposteriorly with the anterior surfaces of the trochleae lying in the same plane, the intertrochlear notches deep, and a large metatarsal facet, correspond to those of the holotype of *P. medianus* (= *P. gracilis*). The transverse diameter at mid-shaft of the tarsometatarsus of "*Neculus rothi*" is 12 mm, while that of the holotype of *P. medianus* (= *P. gracilis*) is 13.5 mm. Consequently, taking into consideration individual size variation, *N. rothi* lies within the size range of *P. gracilis*, of which it is a synonym.

Palaeospheniscus patagonicus

Moreno and Mercerat 1891

LOCALITY: Golfo de San Jorge, Trelew, Gaiman; Chubut Province.

Palaeospheniscus wimani (Ameghino 1905)

LOCALITY: San Julián, Santa Cruz Province.

Palaeospheniscus bergi

Moreno and Mercerat 1891

LOCALITY: Golfo de San Jorge, Trelew; Chubut Province.

REMARKS: *Palaeoapterodytes ictus* Ameghino 1905, which was based on the proximal portion of a strongly weathered right humerus, is included in this species. Simpson (1946) stated *P. ictus* was indeterminate, and that *Palaeoapterodytes* (= *Apterodytes*) was probably a synonym of *Palaeospheniscus* or some other genus from the same beds. Simpson questioned placing *Palaeoapterodytes* in synonymy with *Palaeospheniscus* because "[*Palaeoapterodytes*] probably did not have a bipartite tricipital fossa, which is always present in *Palaeospheniscus*" (Simpson 1972:29). A re-evaluation of the holotype verifies that the tricipital fossa is undoubtedly bipartite and that the specimen shares the size range and other morphological characteristics of the humeri referred to *Palaeospheniscus bergi*.

Chubutodyptes bilocolata Simpson 1970

LOCALITY: Cerro Castillo, Chubut Province.

Paraptenodytes antarcticus

(Moreno and Mercerat 1891)

LOCALITY: The mouth of the Río Santa Cruz, Santa Cruz Province.

Paraptenodytes brodkorbi Simpson 1972

LOCALITY: San Julián, Santa Cruz Province.

Paraptenodytes robustus (Ameghino 1895)

LOCALITY: La Cueva, San Julián, Santa Cruz Province; Gaiman, Chubut Province.

Arthrodytes grandis Ameghino 1901

LOCALITY: San Julián, Santa Cruz Province.

Order Procellariiformes,
Family Procellariidae?:

Argrodyptes microtarsus Ameghino 1905

LOCALITY AND HORIZON: Río Seco, Santa Cruz Province. Basal "Patagoniano."

REMARKS: This species was based upon a supposedly associated distal half of a tibiotarsus and a distal half of a femur. As pointed out by Simpson (1946, 1972), it is not from a species of the Sphenisciformes. Its placement in the Procellariidae, following Brodkorb (1963), is quite probable.

Order Anseriformes, Family Anatidae:
Anatidae new genus new species

LOCALITY: Gaiman, Chubut Province.

REMARKS: This new genus new species, with affinities with the Tachyerini, is currently being described (Tonni in press).

SANTACRUCIAN

Order Rheiformes, Family Rheidae:

Opisthodactylus patagonicus Ameghino 1895

LOCALITY AND HORIZON: Santa Cruz Province. Santa Cruz Fm.

REMARKS: Patterson and Kraglievich (1960) correctly concluded that *Opisthodactylus*, type of the family Opisthodactylidae Ameghino 1895, is not a phorusrhacoid, but a rhea. Brodkorb (1963) included the Opisthodactylidae in the Rheiformes.

Order Pelecaniformes, Family Pelecanidae:

Liptornis hesternus Ameghino 1895

LOCALITY AND HORIZON: Santa Cruz Province. Santa Cruz Fm.

Order Ardeiformes, Family Plataleidae:

Protibis cnemialis Ameghino 1891

LOCALITY AND HORIZON: Monte Observación, Santa Cruz Province. Santa Cruz Fm.

Order Anseriformes, Family Anatidae:

Eoneornis australis Ameghino 1895

LOCALITY AND HORIZON: Monte Observación, Santa Cruz Province. Santa Cruz Fm.

Eutelornis patagonicus Ameghino 1895

LOCALITY AND HORIZON: Monte Observación, Santa Cruz Province. Santa Cruz Fm.

Order Accipitriformes,
Family Accipitridae:

Thegornis musculosus Ameghino 1895

LOCALITY AND HORIZON: Tagua Quemada, Santa Cruz Province. Santa Cruz Fm.

Thegornis debilis Ameghino 1895

LOCALITY AND HORIZON: Corriguen-Kaik, Santa Cruz Province. Santa Cruz Fm.

REMARKS: Brodkorb (1964) includes these two species in the subfamily Circinae. If this is correct, they represent the oldest record for the subfamily.

Family Falconidae:

Badiostes patagonicus Ameghino 1895

LOCALITY AND HORIZON: "Patagonia." Santa Cruz Fm.

Order Galliformes, Family Cracidae:

Anisolornis excavatus Ameghino 1891

LOCALITY AND HORIZON: "Southern Patagonia." Santa Cruz Fm.

Order Ralliformes, Family Phorusrhacidae:

Phorusrhacos longissimus Ameghino 1887

LOCALITY AND HORIZON: La Cueva, Tagua Quemada, Monte Observación, Río Shehuén; Santa Cruz Province. Santa Cruz Fm.

REMARKS: See Brodkorb (1967) for the synonymy of the species included in this family and all other large extinct South American ralliforms.

Family Palaeociconiidae:

Palaeociconia cristata Moreno and Mercerat 1891

LOCALITY AND HORIZON: Monte León, Tagua Quemada, Monte Observación, La Cueva; Santa Cruz Province. Santa Cruz Fm.

Family Psilopteridae:

Pseudolarus eocaenus Ameghino 1891

LOCALITY AND HORIZON: "Patagonia." Santa Cruz Fm.

Psilopterus australis

Moreno and Mercerat 1891

LOCALITY AND HORIZON: Killik-Aike, Monte León, Monte Observación, Take Harvey, La Cueva, Corriguen-Kaik, Tagua Quemada, Karaiken; Santa Cruz Province. Santa Cruz Fm.

Psilopterus communis

Moreno and Mercerat 1891

LOCALITY AND HORIZON: Monte Observación, Lago Pueyrredón, La Cueva, Río Shehuén; Santa Cruz Province. Santa Cruz Fm.

Psilopterus minutus (Ameghino 1891)

LOCALITY AND HORIZON: Monte Observación, Santa Cruz Province. Santa Cruz Fm.

Lophiornis obliquus Ameghino 1891

LOCALITY AND HORIZON: Monte Observación, Santa Cruz Province. Santa Cruz Fm.

FRIASIAN

Order Accipitriformes,
Family Accipitridae:Accipitridae genus and species
indeterminate

LOCALITY AND HORIZON: Ing. Jacobacci, Neuquén Province. Unnamed formation.

REMARKS: This and the following falconid species are the first reported fossil birds from mammal-bearing Friasian sediments. The material is very fragmentary and identification beyond the family level cannot be attempted.

Family Falconidae:

Falconidae genus and species
indeterminate

LOCALITY AND HORIZON: Ing. Jacobacci, Neuquén Province. Unnamed formation.

CHASICOAN

Order Ralliformes, Family Psilopteridae:

Psilopterus new species

LOCALITY AND HORIZON: Arroyo Chasicó, Buenos Aires Province. Vivero member of the Arroyo Chasicó Fm.

REMARKS: This species is currently being described (Tonni in press).

HUAYQUERIAN

Order Accipitriformes,

Family Teratornithidae:

Teratornithidae new genus new species

LOCALITY AND HORIZON: Salinas Grandes de Hidalgo, Departamento Atreucó, La Pampa Province. Epecuén Fm.

REMARKS: This specimen is described by Campbell and Tonni, this vol.

Order Ralliformes, Family Phorusrhacidae:

Andalgalornis ferox

Patterson and Kraglievich 1960

LOCALITY AND HORIZON: Chiquimil, Catamarca Province. Andalgalá Fm.

Onactornis depressus Cabrera 1939

LOCALITY AND HORIZON: Lago Epecuén, Buenos Aires Province. Epecuén Fm.

Family Psilopteridae:

Procariama simplex Rovereto 1914

LOCALITY AND HORIZON: Catamarca Province. "Araucanense stage."

Hermosiornis incertus Rovereto 1914

LOCALITY AND HORIZON: Catamarca Province. "Araucanense stage."

MONTEHERMOSAN

Order Rheiformes, Family Rheidae:

Heterorhea dabbenei Rovereto 1914

LOCALITY AND HORIZON: 17 km SW of Pehuén-Có, Buenos Aires Province. Monte Hermoso Fm.

Order Tinamiformes, Family Tinamidae:

Tinamisornis parvulus Rovereto 1914

LOCALITY AND HORIZON: 17 km SW of Pehuén-Có, Río Quequén Salado, Buenos Aires Province. Monte Hermoso Fm., "Irenense."

REMARKS: For a discussion of this and the following species of tinamous see Tonni (1977a).

Eudromia intermedia (Rovereto 1914)

LOCALITY AND HORIZON: 17 km SW of Pehuén-Có, Buenos Aires Province. Monte Hermoso Fm.

Eudromia sp.

LOCALITY AND HORIZON: Río Quequén Salado, Buenos Aires Province. "Irenense."

Order Ralliformes, Family Psilopteridae:

Prophororhacus rapax

(J. Kraglievich 1946)

LOCALITY AND HORIZON: Atlantic coast near Arroyo Lobería, Partido de Gral. Pueyrredon, Buenos Aires Province. Chapadmalal Fm.

Family Cariamidae:

Chunga incerta Tonni 1974

LOCALITY AND HORIZON: 17 km SW of Pehuén-Có, Buenos Aires Province. Monte Hermoso Fm.

Order Accipitriformes, Family Vulturidae:

Dryornis pampeanus

Moreno and Mercerat 1891

LOCALITY AND HORIZON: 17 km SW of Pehuén-Có, Buenos Aires Province. Monte Hermoso Fm.

REMARKS: A revision of the type material resulted in the placement of this species, originally presumed to be a phorusrhacoid, in the Vulturidae, as stated by Brodkorb (1967). It is closely related to *Vultur*.

"MESOPOTAMIAN"

Order Ralliformes, Family Phorusrhacidae:

Andalgalornis steulleti

(L. Kraglievich 1931)

LOCALITY AND HORIZON: Cliffs of the Río Paraná, Entre Ríos Province. "Mesopotamian" (Basal part of the Ituzaingó Fm. of Aceñolaza (1976)).

REMARKS: For comments on this and the following two species see Patterson and Kraglievich (1960).

Andalgalornis deautieri

(L. Kraglievich 1931)

LOCALITY AND HORIZON: Cliffs of the Río Paraná, Entre Ríos Province. "Mesopotamian" (Basal part of the Ituzaingó Fm. of Aceñolaza (1976)).

Onactornis? pozzii (L. Kraglievich 1931)

LOCALITY AND HORIZON: Cliffs of the Río Paraná, Entre Ríos Province. "Mesopotamian" (Basal part of the Ituzaingó Fm. of Aceñolaza (1976)).

ENSENADAN

Order Tinamiformes?, Family Tinamidae?:

Querandiornis romani Rusconi 1958

LOCALITY AND HORIZON: "Toscas of the Río de la Plata," in the proximity of the Estación Anchorena, Buenos Aires Province. Ensenada Fm.

REMARKS: The type material could not be located for re-study, but some of the characters cited by Rusconi (1958) in his description of the species, e.g., foramen magnum pyriform and skull globular, make its taxonomic position questionable. He compared the material, a skull, with two living species, *Eudromia elegans* and *Fulica leucoptera*, finding similarities and differences that are not only non-diagnostic, but so general that they could be applied to the description of the skull of almost any living bird. In his description Rusconi himself expressed doubts as to whether he should place the fossil in the Tinamiformes, or in the Ralliformes; he felt "inclined" to place it in the Tinamidae.

Order Rheiformes, Family Rheidae:

Rhea anchorenensis

(C. Ameghino and Rusconi 1932)

LOCALITY AND HORIZON: "Reefs of the Río de la Plata opposite the Estación Anchorena," Buenos Aires Province. Ensenada Fm.

REMARKS: Brodkorb (1963) established *Rhea americana anchorenense* C. Ameghino and Rusconi as a separate species, *R. anchorenensis*. A re-evaluation of the holotype verifies this assignment.

Order Anseriformes, Family Anatidae:

Anas leucophrys Vieillot 1816

LOCALITY AND HORIZON: Partido de Gral. Alvarado, Buenos Aires Province. Miramar Fm.

REMARKS: See Tonni (1969) for a report on the occurrence of this species.

Order Psittaciformes, Family Psittacidae:

Cyanoliseus ensenadensis (Cattoi 1957)

LOCALITY AND HORIZON: Olivos, Buenos Aires Province. Ensenada Fm.

REMARKS: For comments on this species see Tonni (1972).

Order Passeriformes, Family Furnariidae:

Cinclodes major Tonni 1977

LOCALITY AND HORIZON: Mar del Plata, Buenos Aires Province. Miramar Fm.

Family Emberizidae:

Zonotrichia robusta Tonni 1970

LOCALITY AND HORIZON: Miramar, Buenos Aires Province. Miramar Fm.

Sicalis sp.

LOCALITY AND HORIZON: Mar del Plata, Buenos Aires Province. Miramar Fm.

REMARKS: Material referable to this genus was studied by Tonni (1973). The size of this specimen must have been similar to that of the living species *Sicalis olivascens* or *S. auriventris*.

Because of the poor representation of the material it was not given a specific assignation. It is, to the present, the oldest record for the genus.

LUJANIAN

Order Tinamiformes, Family Tinamidae:

Nothura paludosa Mercerat 1897

LOCALITY AND HORIZON: Arrecifes, Buenos Aires Province. Buenos Aires Fm.

REMARKS: This species, like others described by Mercerat, was not adequately described or figured. As in other instances, a re-evaluation of the type was not possible because it could not be located.

Order Rheiformes, Family Rheidae:

Pterocnemia fossilis Ameghino 1882

LOCALITY AND HORIZON: Olivera, Buenos Aires Province. Buenos Aires Fm.

REMARKS: *Rhea pampeana* Moreno and Mercerat 1891 is a synonym of *Pterocnemia fossilis* Ameghino.

Rhea azarae (Moreno and Mercerat 1891)

LOCALITY AND HORIZON: Monte Hermoso, Buenos Aires Province. "Pampeano."

REMARKS: The incomplete femur on which Moreno and Mercerat founded *Protorhea azarae* is assignable to *Rhea*, and not to a camel, "*Auchenia lujanensis*," as assumed by Ameghino (1891). Its placement in a species separate from *Rhea americana* is only tentative because of the fragmentary nature of the material.

Order Anseriformes, Family Anatidae:

Neochen debilis (Ameghino 1891)

LOCALITY AND HORIZON: La Plata, Buenos Aires Province. "Belgranense stage."

Order Ralliformes, Family Rallidae?:

Euryonotus brachypterus Mercerat 1897

LOCALITY AND HORIZON: Arrecifes, Buenos Aires Province. Buenos Aires Fm.

Euryonotos argentinus Mercerat 1897

LOCALITY AND HORIZON: Arrecifes, Buenos Aires Province. Buenos Aires Fm.

Order Charadriiformes, Family Laridae?:

Pseudosterna degener Mercerat 1897

LOCALITY AND HORIZON: Luján, Buenos Aires Province. Luján Fm.

Pseudosterna pampeana Mercerat 1897

LOCALITY AND HORIZON: Arrecifes, Buenos Aires Province, Buenos Aires Fm.

Order Accipitriformes, Family Falconidae:

Lagopterus minutus

Moreno and Mercerat 1891

LOCALITY AND HORIZON: Luján, Buenos Aires Province. Buenos Aires Fm.

REMARKS: The holotype of this species, which should have been in the collections of the Museo de la Plata, could not be found. The figure given by the authors is unclear, but the specimen could probably be assigned to *Polyborus*.

Order Pelecaniformes,

Family Phalacrocoracidae:

Phalacrocorax brasilianus (Gmelin)

LOCALITY AND HORIZON: Luján, Buenos Aires Province.

REMARKS: Moreno and Mercerat (1891) named *Phalacrocorax pampeanus* on the basis of an incomplete humerus, which was actually a specimen of *P. brasilianus* (Gmelin).

RECENT

The sediments named "lacustrine post-pampean" by Ameghino (1898), or "platense stage" by Ameghino (1898) and Doering (1882), were assigned, even in recent works, to the Pleistocene, following the scheme used by Ameghino throughout his works. But these sediments, at least those from typical localities from which bird remains were collected, e.g., Cañada de Rocha, Luján, and Mercedes, are actually post-Pleistocene in age. The sediments of the "platense stage" were deposited in enclosed basins and flood plains as lentic and lotic deposits in Buenos Aires Province, and no extinct megafauna has ever been recovered from them. All the species recovered as fossils belong to the Recent indigenous fauna of the area. With reference to the birds, even Ameghino (1898) pointed out that their remains are identical to those of Recent species. The following species are all from these deposits.

Sarcoramphus fossilis Moreno and Mercerat 1891 and *Cathartes fossilis* Moreno and Mercerat 1891 were correctly assigned to *Vultur gryphus* Linnaeus and *Cathartes aura* Linnaeus by Ameghino (1891). The assignment of *Sarcoramphus fossilis* to *S. papa* by Brodkorb (1963:257) is incorrect.

Foetopterus ambiguus Moreno and Mercerat 1891 was assigned to *Chloephaga picta* Gmelin by Tonni (1970).

Rhea fossilis Moreno and Mercerat 1891 is assignable to *R. americana*, as stated by Ameghino (1891) and verified by Brodkorb (1963:201). *Rhea subpampeana* Moreno and Mercerat 1891 is also assignable to *R. americana*.

DISCUSSION

SPHENISCIFORMES. The penguins from the "Patagoniano" comprise nine species distributed in four genera. Of the nine species, seven are found in deposits of similar age (late Oligocene-early Miocene) and in the same locality (lower course of the Río Chubut between Gaiman and Trelew). According to Simpson (1972), this is the greatest known diversity of penguins for a restricted area and geologic age, including the present.

The numerous new collections obtained by the Museo de La Plata in recent years have partially verified Simpson's (1972) hypothesis that the larger-sized species like *Arthrodrytes grandis* and *Paraptendrytes brodkorbi* are found in more southerly deposits (San Julián), whereas those of smaller size come from more northerly deposits (Gaiman, Trelew). An exception to this is a record of *Paraptendrytes robustus* from Gaiman. *Palaeospheniscus gracilis* appears to be represented exclusively in those sediments of the "Patagoniano" immediately overlying

the contact with the Colhué-Huapi Fm. in the lower course of the Río Chubut, in association with *Lamna cattica totuserata* (Chondrichthyes: Isuridae) which is very abundant in the same levels, but which totally disappears 20 to 40 m above the above-mentioned contact.

RHEIFORMES. *Opisthodactylus patagonicus* Ameghino 1895, from the early Miocene (Santacruzian) of Patagonia, is the first record of the order Rheiformes. Patterson and Kraglievich (1960) correctly assigned this species to the Rheidae. One record of a Recent genus is represented in the middle Pleistocene (Ensenadan) of Buenos Aires Province, while fossils of Recent species have been found in late Pleistocene (Lujanian) deposits of the same area. All known fossil rheas have been found within the present area of distribution of the family.

TINAMIFORMES. The first representatives of this order are found in Pliocene (Montehermosan) sediments of Buenos Aires Province. Two living genera, *Eudromia* and *Nothura*, are reported from these deposits, and perhaps also the Recent species *Nothura maculosa* (see Tonni 1977a).

PROCELLARIIFORMES. *Argrodyptes microtarsus* Ameghino 1905, from marine sediments of the "Patagoniano," was described by Ameghino as a species of penguin. Simpson (1946) doubted that the species could be assigned to the Spheniscidae, and demonstrated its probable relationships with the Procellariiformes. Brodkorb (1963) correctly concluded that *A. microtarsus* belonged to the Procellariidae, a fact corroborated by Tonni (in press).

The Procellariidae are well represented in the early and middle Miocene of North America and Europe, but *Argrodyptes microtarsus* is the only fossil record of the family for South America.

PELECANIFORMES. *Cladornis pachypus* Ameghino 1895, from lower Oligocene (Deseadan) sediments of Santa Cruz Province, is the first record for the order in South America. Wetmore (1960) placed this species in a new suborder, Cladornithes, that would also include *Cyphornis magnus* Cope 1894 and *Palaeochenoides mioceanus* Shufeldt 1916, both from the early Miocene of North America.

Liptornis hesternus Ameghino 1895, of the early Miocene (Santacruzian) of Santa Cruz Province, represents, together with *Pelecanus gracilis* Milne-Edwards 1863 from the early Miocene of Europe, the oldest record for the Pelecanidae. This family is now comprised of only one genus, *Pelecanus*, that is widely distributed in almost all tropical and warm temperate areas of the world. Over a dozen extinct species are known, all but *Liptornis hesternus* referred to *Pelecanus*.

The only records of the Phalacrocoracidae in South America are the reports of the Recent *Phalacrocorax brasilianus* in late Pleistocene deposits of Argentina (Buenos Aires Province) and Brazil, and *P. olivaceus* and *P. bougainvillii* in late Pleistocene deposits of Peru (Campbell 1979).

PHOENICOPTERIFORMES. The order Phoenicopteriformes is represented by two species of the extinct family Presbyornithidae, *Presbyornis antiquus* (Howard 1955) and *P. pervetus* Wetmore 1926 from the early Eocene (Casamayoran) of Chubut Province. *P. pervetus* has also been reported for deposits of a similar age in North America.

ARDEIFORMES. *Ciconiopsis antartica* Ameghino (1899, from lower Oligocene (Deseadan) deposits of Santa Cruz Province, is the oldest record of the Ciconiidae for the Americas,

and for the world as well since this family is recorded for the first time in the Old World (Europe) in the late Eocene–early Oligocene.

Protibis cnemialis Ameghino 1891, from the early Miocene (Santacruzian) of Patagonia, is also the oldest record of the Plataleidae for the Americas.

ANSERIFORMES. The position of *Teleornis impressus* Ameghino 1899 and *Loxornis clivus* Ameghino 1895 within this order is uncertain. Species undoubtedly belonging to the Anatidae are recorded from the early Miocene (Santacruzian) with the appearance of *Eoneornis australis* Ameghino 1895 and *Eutelornis patagonicus* Ameghino 1895, and earlier in the marine sediments of the "Patagoniano" (late Oligocene–early Miocene) where an extinct species with affinities with the Tachyerini has been found (Tonni in press). Neospecies have been recorded from middle Pleistocene deposits onward in Buenos Aires Province (Tonni 1969).

ACCIPITRIFORMES. *Cruschedula revola* Ameghino 1899 and *Climacarthrus incompletus* Ameghino 1899 are both based on non-diagnostic material and their position within the order is uncertain, but their assignment to the Accipitridae seems reasonable. Undoubted members of the Accipitridae are reported for the Santacruzian, with the appearance of *Thegornis musculosus* Ameghino 1895 and *T. debilis* Ameghino 1895. *Badiostes patagonicus* Ameghino 1895 is also from Santacruzian deposits.

The first records of these birds of prey coincides with those of the caviomorph rodents, during the early Oligocene (Deseadan). In the Miocene (Santacruzian and Friasian), such rodents and other small rodent-like mammals, e.g., the Interatheriidae and Hegetotheriidae, acquire a great species diversity and population density, coinciding with a notable increase in the number of accipitrids represented during the Friasian (in addition to those listed above, two or three species have been collected but have yet to be studied).

GALLIFORMES. *Anisolornis excavatus* Ameghino 1891, from the early Miocene (Santacruzian) of Patagonia, is the oldest record for the Cracidae in South America. The family is at present restricted to the warm forested areas of the Neotropical Region. Only a few fossils, all attributed to neospecies, are known from the late Pleistocene (Brazil, Peru), so their evolutionary history is almost totally unknown.

OPISTHOCOMIFORMES. This order is represented in the early Eocene (Casamayoran) of Patagonia by *Onychopteryx simpsoni* Cracraft 1971. The ecological requirements of this species seem to have been similar to those of the living representatives of the order, as suggested by the presence of other faunistic indicators, e.g., Leptodactylidae, Alligatoridae, and Boidae. During the early Eocene a fauna evolved in Patagonia under conditions of relatively high temperature and humidity, along with a shrubby or grassy steppe vegetation (indicated by the presence of grazing mammals) and isolated forests.

RALLIFORMES. This is the best represented avian order, both in terms of diversity and number of specimens, of the Cenozoic of Argentina. At the present, numerous species distributed in six families live in South America. In Tertiary sediments dating from the early Eocene of Chubut Province (materials from Cañadón Hondo are still being studied) are found representatives of five other, extinct, families. These five families, generally called "Phorusrhacoids," differentiated into several different adaptive types, such as cursorial predators

(Phorusrhacidae), graviportal scavengers (Brontornithidae), and cursorial predators capable of limited flight (Psilopteridae).

In the Deseadan sediments of Patagonia three of the extinct families are represented: Phorusrhacidae, Brontornithidae, and Psilopteridae. A species of the Cariamidae, *Riacama caliginea* Ameghino 1899, is recorded for the first time. This family is restricted to South America, being represented at the present time by two monotypic genera, *Cariama* Brisson and *Chunga* Hartlaub. A new species of *Chunga* is currently being described from Montehermosan sediments of Buenos Aires Province.

Cunampaia simplex Rusconi 1946 is recorded from the late Eocene–early Oligocene of Mendoza Province. It represents a monotypic family of questionable taxonomic position.

During the Santacruzian the large phorusrhacoids reach their greatest diversity. At this time there existed representatives of four families: the three mentioned above for the Deseadan, and the Palaeociconiidae. The decline of this group, both in numbers and diversity, began before the end of this period. During the Huayquerian, only the Phorusrhacidae and Psilopteridae are present, represented by a total of four species. In Montehermosan deposits there are also records of the last two mentioned families, but the number of specimens found in well-known localities is low. There are no records of these large ralliforms in Uquian deposits.

The oldest record for the family Aramididae is *Aminornis excavatus* Ameghino 1899, from the early Oligocene of Santa Cruz Province. *Loncornis erectus* Ameghino 1899, from the same locality and horizon, is placed with doubt in that family by Brodkorb (1967).

Euryonotus brachypterus Mercerat 1897 and *E. argentinus* Mercerat 1897 were placed in the Rallidae by Mercerat. The type material could not be located and the descriptions are too brief to enable verification of that assignment. These fossils came from late Pleistocene deposits of Buenos Aires Province.

CHARADRIIFORMES. The Laridae are represented in the late Pleistocene of Buenos Aires Province by two presumed extinct species: *Pseudosterna degener* Mercerat 1897 and *P. pampeana* Mercerat 1897. But, as with the case with the rallids described by Mercerat, their taxonomic position is very doubtful.

PSITTACIFORMES. One extinct species of the Psittacidae, *Cyanoliseus ensenadensis* (Cattoi 1957), is known from Argentina (middle Pleistocene of Buenos Aires Province). The living species *C. patagonus* was present in the late Pleistocene of Argentina (Buenos Aires Province).

PASSERIFORMES. The Furnariidae are represented by an extinct species of *Cincludes*, *C. major* Tonni 1977, from the Ensenadan of Buenos Aires Province. *C. major* shows a degree of specialization similar to that of *C. patagonicus* (Gmelin).

The only other family of this order unquestionably represented in Cenozoic sediments of Argentina is the Emberizidae, of which one extinct species, *Zonotrichia robusta* Tonni 1969, and one undetermined species of *Sicalis* are known. Both are from middle Pleistocene deposits of Buenos Aires Province.

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